

Not Just Any Child Care Center? Social and Ethnic Disparities in the Use of Early Education Institutions with a Beneficial Learning Environment

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Abstract

This study investigates social and ethnic differences in the use of early childhood education and care (ECEC) centers with different learning environments in an ECEC system with universal state-subsidized provision and low fees. Based on the German “National Education Panel Study – Kindergarten Cohort” from 2011, we matched data on 587 groups in 253 ECEC centers with information on about 1,700 children and their parents and applied stepwise multivariate regression models. *Research findings:* The results show that social and ethnic differences tended to be small and were mostly not significant in terms of structural quality, activities and materials in ECEC centers. In contrast, large disparities emerged regarding the use of ECEC centers with different compositions of children: Children of lower educated parents and those with a non-German family language attended institutions with higher proportions of children from families with low-educated parents and from families with a non-German family language, respectively. *Policy implications:* To counteract and compensate for the large disparities in social and ethnic composition of children in ECEC centers, state funding rules and structural quality standards should take the composition more strongly into account.

Keywords: early education, early childhood education and care (ECEC) center, ECEC quality, ECEC composition, family language, ECEC selection

Introduction

Children start school with different levels of skills and knowledge and therefore have different chances for educational success right from the start. Two especially disadvantaged groups in this regard are children of parents with a low socio-economic status (SES) and children of immigrants who, on average, tend to show lower levels of school readiness (e.g., De Feyter & Winsler, 2009; West, Denton, & Germino-Hausken, 2000; various possible reasons for this disadvantage are discussed by Bradley & Corwyn, 2002). These early social and ethnic differences in children's skills point to the relevance of early education. It is therefore not surprising that the political debate about educational inequality puts a strong focus on early education and conveys the hope that early childhood education and care (ECEC) institutions might compensate for differing skill levels and therefore especially serve disadvantaged children.

Studies about the impact of ECEC tend to support the expectation that attending such institutions yields positive effects on children's development although this influence varies by age and developmental domain (Gormley, Phillips, & Gayer, 2008). The strongest positive impact has usually been found in the domain of cognitive competencies (Burger, 2010; Camilli, Vargas, Ryan, & Barnett, 2010) which supports the claim that ECEC centers are important to promote children's academic skills. However, two points need to be considered in this regard. Firstly, research has shown that the effect of ECEC centers depends on specific characteristics of these institutions, like their quality (Dearing, McCartney, & Taylor, 2009; Keys et al., 2013) and the composition of children in these centers (Melhuish et al., 2008; Reid & Ready, 2013). The most advantageous measure is therefore not just attendance at *any* ECEC institution but one that offers a beneficial learning environment. Secondly, the use of ECEC institutions is selective, especially at younger ages. It is not at random which children attend early education institutions (Bainbridge, Meyers, Tanaka, & Waldfogel, 2005). However, while a lot of research has

addressed the selectivity of attending an ECEC center *at all* (at different ages), much less research has dealt with the selectivity of attending ECEC centers with *certain characteristics*.

In this article, we analyze social and ethnic disparities in the use of early education institutions with a beneficial learning environment in families with four- and five-year-old children in Germany. We use the term “beneficial learning environment” to refer to a context that, on average, positively contributes to children’s development. We consider different dimensions of the ECEC centers’ learning environment by including indicators on the ECEC centers’ structural quality, learning activities and the composition of children in the centers. Our research question is whether children of low-educated parents and children with a non-German family language are less likely to attend ECEC centers with a beneficial learning environment compared to children of parents with higher educational levels and children of parents who speak German at home while taking into account several family characteristics (like parents’ employment status and family income) and residential characteristics (like ECEC quality on the regional level and residential segregation). We are, therefore, interested in social and ethnic differences in parents’ ECEC use controlling for different access possibilities (e.g. due to regional variation). The empirical analyses are based on data of the German “National Educational Panel Study” (NEPS) – Starting Cohort 2 (Kindergarten).

Germany provides an interesting case for our research questions for two reasons. The first reason relates to the very high rate of ECEC attendance in Germany. In 2015, 96% of all four-year-old children and 98% of all five-year-old children attended an ECEC center (“Kindergarten”) (Autorengruppe Bildungsberichterstattung, 2016, p. 245). Therefore, the question of whether or not to attend an ECEC center has been replaced by the question *which* ECEC institution is selected. The second reason is that considerable variations in the quality (Tietze et al., 2013) and in the composition (Statistisches Bundesamt, 2013) of German ECEC

centers have been found across institutions. At the same time, the ECEC system in Germany has been rather homogeneous in terms of access and costs due to universal state-subsidized provision and low fees for parents (Immervoll & Barber, 2005). This provides us with the opportunity of a rather conservative test regarding the hypothesis of selectivity in the use of ECEC institutions with a beneficial learning environment.

The German ECEC System

ECEC programs are part of the child and youth welfare system in Germany. Although the federal government has legislative authority, the states (“Länder”) are responsible for the implementation. The actual planning and provision of ECEC services takes place at the municipality level (“Gemeinde”). Since 1996, all children aged three years to school age have been entitled to a half-day slot in an ECEC center (“Kindergarten”). In 2015, 95% of all children in this age group attended an ECEC center (Autorengruppe Bildungsberichterstattung, 2016, p. 245). ECEC attendance from age three has become a strong cultural norm irrespective of economic, social and ethnic background.

The financing costs of ECEC centers (“Kindertageseinrichtungen”) have been largely covered by municipalities (“Gemeinden”) (about 47%) and by the states (“Länder”) (about 31%). Since 2009, the federal level (“Bund”) has also contributed a small portion. The rest has been split between providers (about 5%) and parents (on average about 14%) (BMFSFJ 2013; Spieß, 2008). Parents’ fees are mostly income-dependent (except in Hesse) and relatively low compared to most other OECD countries (Immervoll & Barber, 2005). In 2011, they amounted on average to 144 Euros per month (Müller et al., 2013). In most states, they depend on the number of siblings in ECEC institutions (“Kindertageseinrichtungen”), child age, income and whether attendance is half-day or full-day. Parents can generally choose freely between ECEC centers in Germany; there are no designated catchment areas for ECEC centers. Due to tightly regulated

fees, parents generally cannot obtain higher quality by paying higher fees. Therefore, our analysis of ECEC use focused on differences by parental educational and family language rather than income.

Minimum standards for structural quality vary considerably across federal states (“Länder”) and tend to be worse than the levels recommended in the targets of the National Association for the Education of Young Children (NAEYC) Early Childhood Program Standards and Accreditation Criteria (NAEYC, 2014). Maximum child-teacher ratios for children age three to five range from 10 to 20 children per educator. The formulation of minimum requirements for most other aspects of structural quality, such as maximum group size, training, and space, ranges from precise to none at all (Bock-Famulla, 2008). ECEC centers are required to undergo regular quality inspections by external assessors. Beyond assuring minimum standards, funding is not linked to these quality assessments in any way.

Further variations in the learning environment of ECEC groups may arise from considerable residential segregation (Friedrichs & Triemer, 2009), as parents tend to choose an ECEC center in close proximity from home. In a representative survey in 2013 and 2014 (K²ID, 2015, own calculations), proximity was by far the most frequently mentioned criterion for parents’ ECEC (“Kindergarten”) choice. German parents also appear to prioritize other work-family compatibility aspects of child care centers, such as opening hours and having siblings in the same institution, over aspects related to the pedagogic quality, such as child-teacher-ratios, group size, or stimulating activities (see Appendix Table A.1). When they had more applications than places, ECEC centers in Germany were most likely to select the oldest children, those with a sibling in the same institution or prioritized children of single parents or those with two employed parents. Only 7 and 3 percent of institutions, respectively, reported as one of the top three criteria

that children were selected based on a waiting list or based on talks with children and parents (K²ID, 2015, own calculations).

A recent study on ECEC process quality in Germany (“National Study of Child-Care in Early Childhood” - NUBBEK) has shown that out of 146 evaluated ECEC centers for children from the age of three (“Kindergärten”), the majority offered a pedagogic quality which can be classified as sufficient but not as good as measured by the “Kindergarten-Skala” (revised) (KES-RZ) and its complement for specific educational domains KES-E (Tietze et al., 2013, p. 75). On the one hand, this suggests that quality levels and variations between institutions may well be of concern to parents – at least to certain groups. On the other hand, since the vast majority (over 80%) of the centers offers mediocre quality, parents possibly do not perceive large differences between centers in terms of quality and therefore may be less concerned about quality aspects. State institutions do not offer parents any information on quality aspects of specific ECEC centers. As indicated by US studies (Mocan, 2007), also in the German context parents are likely to lack information for reliably assessing quality aspects of ECEC institutions (see Cryer, Tietze, & Wessels, 2002).

Theoretical Background and Previous Studies

We are interested in social and ethnic disparities in using an ECEC center with a beneficial learning environment.

What Constitutes a Beneficial Learning Environment in ECEC Institutions?

We speak of an ECEC center as having a “beneficial learning environment” when its characteristics positively affect children’s cognitive and language development. The effects in other domains are less clear and will not be covered here. In particular, we address two dimensions of the ECEC learning environment: the quality of ECEC centers and the composition of children in ECEC centers.

The Quality of ECEC Institutions. Regarding the quality of ECEC institutions, the differentiation between structural quality and process quality is well-established. *Structural quality* refers to the “objective aspects of the child care environments” (Helburn & Howes, 1996, p. 64) like the adult-child ratio, group size and teacher education/training. *Process quality* refers to “how children experience child care – their interactions with adults who care for them and their exposure to materials and activities that enhance learning” (Helburn & Howes, 1996, p. 64). In the empirical part of this paper, we will only be able to include proxy indicators for this latter aspect of process quality which relate to materials and learning activities. Several studies showed that attending high-quality ECEC institutions relates positively to children’s cognitive and language development although the effect sizes are usually only small to moderate (e.g., Dearing et al., 2009; Keys et al., 2013). Structural quality indicators often work indirectly by influencing the process quality (NICHD, 2002).

The Composition of Children in ECEC Institutions. The composition of children in an ECEC center refers to the proportion of children with certain characteristics in that center, e.g. the proportion of children from high SES families. The main mechanism why the composition of children can be expected to influence children’s development are peer effects (Reid & Ready, 2013; Reid, Kagan, Hilton, & Potter, 2015). Children can learn from each other in the daily interactions and play activities in ECEC centers. Such peer interactions can be regarded as “naturally occurring opportunities (...) through which early skills in the cognitive domain can be supported, modeled, and extended by peers” (Bulotsky-Shearer, Bell, Romero, & Carter, 2012, p. 54). Research on peer learning in ECEC institutions has demonstrated positive associations between positive peer play interactions and learning outcomes including cognitive and language skills (Bulotsky-Shearer et al., 2012; Mendez & Fogle, 2002). The presence of more skilled peers might be more advantageous in this regard: “Higher skilled peers who have a larger vocabulary,

ability to express themselves, greater familiarity with print materials, and well-developed social skills could stimulate skill development among other children within their preschool environment” (Henry & Rickman, 2007, p. 101). Since the average ability of children in ECEC centers and the SES composition are quite highly correlated (Melhuish et al., 2008, p. 101; Weiland & Yoshikawa, 2014, p. 428), it is not surprising that empirical studies have found the average ability of peers as well as the SES composition in ECEC centers to be significantly related to children’s cognitive and language skills (Henry & Rickman, 2007; Melhuish et al., 2008; Reid & Ready, 2013; Weiland & Yoshikawa, 2014). Peer effects in ECEC centers might be especially beneficial for children with a different family language at home regarding their second language (L2) acquisition, since peer interactions provide natural opportunities for language learning – and in this respect also the composition of children in the ECEC center regarding the proportion of L2 speakers has been shown to be relevant (*Author 2017*; Niklas, Schmiedeler, Pröstler, & Schneider, 2011). Besides these direct peer effects, the composition of children may have additional indirect effects, e.g. by affecting the frequency of disruptions in the class or teacher expectancies and motivation (Henry & Rickman, 2007).

It is important to note that quality measures and social compositions of ECEC centers are often weakly to moderately correlated (Antle et al., 2008; Tietze et al., 2013; Torquati, Raikes, Huddleston-Casas, Bovaird, & Harris, 2011), e.g. because better teachers tend to self-select into high-SES, low-minority ECEC centers (see Reid et al., 2015). However, from a theoretical point of view, we expect both to have independent effects on children’s development (e.g., teacher effects *and* peer effects). Results of empirical studies have confirmed this by detecting composition effects on children’s skills even when quality indicators have been considered simultaneously (Henry & Rickman, 2007; Reid & Ready, 2013; Weiland & Yoshikawa, 2014). We conclude that the quality of ECEC centers and the composition of children in ECEC centers

are two dimensions of the ECEC learning environment that both affect children's cognitive and language development.

Which Children Attend ECEC Institutions with a Beneficial Learning Environment?

As theoretical framework of this article, we have used an investment perspective based on the family investment model (Becker & Tomes, 1986) and combined it with the accommodation model (Chaudry, Henly, & Meyers, 2010; Meyers & Jordan, 2006). The basic idea of the investment perspective is that parents invest in their children's development by providing a beneficial learning environment at home and/or by choosing a beneficial learning environment outside the home for their child (e.g., an ECEC center with characteristics that positively affect children's development). However, parents are also subject to time and budget constraints and, therefore, also practical considerations of proximity, costs and opening hours play an important role (Chaudry et al., 2010). Since proximity is usually a very important criterion, it has to be noted that parents' selection of an ECEC center is already pre-structured by the regional supply. Furthermore, the economic investment perspective on child care choices has been especially criticized for the assumptions of perfect information and homogeneous and stable ECEC preferences on part of the parents (Chaudry et al., 2010; Meyers & Jordan, 2006). The accommodation model takes these criticisms into account and interprets ECEC decisions as "accommodations – to family and employment demands, social and cultural expectations, available information, and financial, social, and other resources" (Meyers & Jordan, 2006, p. 53). From this theoretical model, we expected disparities in the use of ECEC centers with a beneficial learning environment because parents' preferences, expectations and constraints as well their resources are likely to be unevenly distributed across social groups.

Selectivity in ECEC Use by Parental Education. We expected that higher educated parents are more likely to select ECEC centers with a beneficial learning environment than lower

educated parents because they usually have more cultural and social resources that are helpful in this regard. Knowledge about the ECEC system in general (e.g., application and registration procedures) and information about ECEC quality in particular (e.g., about quality indicators) is likely to be unevenly distributed by parental education. In addition, higher educated parents might stronger oppose ECEC centers with a high proportion of low-SES children or immigrant children because they tend to associate such compositions of children with poorer learning conditions (Morris-Lange, Wendt, & Wohlfarth, 2013).

Selectivity in ECEC Use by Family Language. Informational resources regarding ECEC centers are probably also unevenly distributed by families' migration status. Knowledge about the preschool system and ECEC centers is very society-specific and immigrant parents may therefore often lack such knowledge. In addition, language barriers may also hamper further information seeking (Brandon, 2004). This is also the reason why we focus on family language in particular. It could also be argued that families with a foreign family language prefer ECEC centers with a culturally and linguistically familiar setting (this argument has been made by Neild, 2001 regarding Hispanics' school choices) and therefore have different preferences regarding the composition of children in an ECEC center.

Studies on the Choice of High-Quality ECEC Centers

In the US, McCartney, Dearing, Taylor and Bub (2007) as well as Pianta et al. (2002) reported a bivariate positive association between mothers' education and the process quality of the ECEC center that their children attended using the data of the "NICHD Study of Early Child Care and Youth Development" (NICHD SECCYD), while the NICHD Early Child Care Research Network (1997) did not find a significant association between maternal education and the process quality of child-care center in multivariate analyses with this data. Also results based on regional data yielded inconsistent results. For example, Bolger and Scarr (1995) reported a

significant positive relation between parental education and ECEC quality, while Karoly et al. (2008) did not find such an association. Also a study in New Zealand showed only weak evidence regarding the association between parental education and ECEC quality (Barraclough & Smith, 1996). Regarding differences by migration background, Karoly and Gonzalez (2011) found in the US that children of immigrants attended center-based programs of lower average process quality than children of native-born parents while Mathers et al. (2007) found in the UK that children of Pakistani/Bangladeshi origin received a higher quality curricular provision than children from white British families (a differentiation by family language was not conducted in these studies). In Germany, Lehl, Kuger, and Anders (2014) did not find any significant association between mother's education and choice of a high-quality ECEC institution ("Kindergarten") in a regional sample in two German federal states. However, they detected that children of with a non-German family language were less likely to attend a high-quality ECEC center than children with German as family language even when the social background of the family was taken into account. But this difference was only found for one out of two process quality indicators and was only significant at $p < 0.1$.

To sum up, the empirical evidence for selectivity in using high-quality ECEC centers by parental education is rather weak and inconsistent. This may be due to different regional contexts and covariates that were taken into account in these studies. In our study, we tried to take regional characteristics, particularly the local supply of high quality ECEC centers, into account and controlled for a large set of covariates. Since the quality of ECEC centers is very difficult for parents to evaluate at all (Cryer et al., 2002), it could also be the case that disparities only appear with regard to quality indicators that are relatively easy to observe for parents (e.g., group size). Our study will also make a contribution in this regard by analyzing various quality indicators that differ regarding the ease of observability for parents. Hardly any research exists regarding the

selectivity in using high-quality ECEC centers by family language. Our study will therefore substantively broaden the research literature in this respect.

Studies on the Choice of ECEC Centers with Specific Social and Ethnic Compositions

The choice of educational institutions with specific compositions of children has been mainly addressed in the school choice literature in the context of the ethnic and socioeconomic segregation of schools. It has been observed that white middle class parents avoid schools with high proportions of students from ethnic minorities and from poor families (which often means that they completely avoid schools in poor communities) (e.g., Roda & Wells, 2013; Saporito, 2003). One may speculate that similar mechanisms are at work with regard to the choice of ECEC centers with different children compositions. Using data on pre-K and Head Start enrollment in the US, Reid, Kagan, Hilton and Potter (2015) report that most children attend preschools that are segregated by SES and often also by ethnicity. In Germany, *Author* (2010) has analyzed the selection into ECEC centers (“Kindergärten”) with a high share of children of immigrants in two federal states. Controlling for residential segregation, she showed that parents with a high educational level and native-born parents were less likely to select an ECEC center with a high proportion of immigrant children than low-educated and parents with migration background.

Regarding the selection of ECEC centers with specific compositions of children it is important to note that such choices are also strongly structured by the residential area. Since most parents prefer ECEC centers near their homes, the social and ethnic residential segregation is mirrored in the composition of children in ECEC centers (Reid et al., 2015, p.8). It is therefore important to take the residential segregation into account in such studies.

To sum up, it is evident that hardly any empirical evidence exists regarding the selectivity in using ECEC centers with specific social and ethnic compositions of children. Most of the

current knowledge in this area stems from the school choice literature. Our study will therefore provide new insights in this area.

Hypotheses

To sum up, we are interested in the selectivity of using an ECEC institution with a beneficial learning environment and consider ECEC quality and the composition of children as important dimensions in this regard. We expect that parents differ in their preferences and possibilities in this selection process and hypothesize disparities in the selection of ECEC institutions by parental education and family language:

H1: Children of lower educated parents are more likely to attend ECEC centers with lower levels of structural quality and learning activities, and with a smaller share of children from high-SES families and a larger share of children with a non-German family language compared to children of higher educated parents.

H2: Children of families with a non-German family language are more likely to attend ECEC centers with lower levels of structural quality and learning activities and with a smaller share of children from high-SES families and a larger share of children with a non-German family language compared to children with German as family language.

Data and Method

Participants

To test these hypotheses, we used data from wave 1 of the Starting Cohort 2 (Kindergarten) of the “National Educational Panel Study” (NEPS) in Germany (Blossfeld, Roßbach, & von Maurice, 2011). This is a nationwide, representative sample of 279 ECEC institutions (“Kindergärten”) and within them a subsample of 2,741 children in the year 2010/2011 who attended these facilities two years prior to regular school enrollment in Germany. The sample was drawn in a multi-stage approach. Institutions were drawn in a first step and children in a second.

Most children were 4 or 5 years old at the time of data collection (mean age 4.99 years). To get relevant information on institutional and familial contexts of children, ECEC educators, directors of the ECEC institutions, as well as parents of the children were surveyed. 2,340 parents – mostly mothers as the main caregivers of the children – were interviewed via telephone. From the ECEC institutions, the NEPS obtained information using paper-based questionnaires from 831 educators and 237 principals on the education and care context in these institutions and specific classes attended by the children.

To explore social and ethnic differences in ECEC use, we matched data on characteristics of the respective ECEC class or the whole ECEC center attended by the children with information on their parents. In addition, we added regional characteristics to our data. To account for regional variation in ECEC quality, we supplemented the data by administrative records on average structural quality of ECEC institutions for 3-6-year old children (“Kindertageseinrichtungen”) at county level (“Kreise”) compiled by the German Youth Institute. To capture social and ethnic variation in residential context, we added administrative records of the county unemployment rate (Regionaldatenbank Deutschland, 2014) and small-scale neighborhood information from the Microm data set (Goebel, Spieß, Witte, & Gerstenberg, 2007). In total there are 402 counties (“Kreise” and “kreisfreie Städte”) in Germany. In 2011 these counties covered on average about 4,805 children aged three to six years who attended an ECEC institution (“Kindertageseinrichtung”). Neighbourhood is the lowest level of regional analysis capturing aggregated information from households at the residential block level (“Häuserblock”).

We restricted the analysis to children where we had information on their ECEC center context at the group and institution level and whose main caregiver completed an interview. Non-response analyses revealed that ECEC institutions in East Germany were underrepresented.

Parents were more likely not to fill in the questionnaire among ECEC groups where educators attended less further training, performed fewer activities and where a larger percentage of children had low educated parents (results are available on request from the authors). We applied combined cross-sectional weights to account for the selective survey participation of ECEC teachers as well as of children and their parents. Item non-response for most items was well below 10 percent. Of the independent household level variables only the variable on household income had a significant number of missing values. We reran the models imputing these missing values using multiple imputations with chained equations based on 10 imputation cycles (Rubin, 1987). The imputed results did not differ qualitatively from the results based on the complete sample, therefore only the latter have been presented. The largest number of item non-response for the dependent variables were found for the material index (14 percent). Also in this case, results from models with imputed missing values for the material index did not change our results.

A small number of counties did not provide the register data on child-teacher-ratios, education of teachers, or the unemployment rate. Dummy variables indicating missing information on these indicators were included in all models and were not significantly related with measures of ECEC quality and learning environment, once household and provider characteristics were controlled. The final sample consisted of about 1,700 children who were cared for in 587 groups in 253 ECEC institutions (“Kindergärten”) across 162 German counties (“Kreise” and “kreisfreie Städte”). The exact sample size in the models varied slightly by dependent variable (between 1,535 and 1,801 children, see Tables 3-5).

Dependent Variables: Aspects of the ECEC Learning Environment

We used nine dependent variables to capture different dimensions of the ECEC learning environment. Descriptive statistics of all variables are presented in Table 1.

Structural quality. We considered the group size, child-teacher-ratio, and the frequency of further training for pedagogic staff as three measures of structural quality. Many studies find that lower child–staff ratios are associated with higher process quality, whereas a smaller number of studies find associations with a smaller group size and more frequent further training (for a review, see Kuger, Kluczniok, Kaplan, & Rossbach, 2016). The group size is based on the number of children registered in the respective group. To calculate the child-teacher ratio, the group size was divided by the number of pedagogic staff responsible for the group measured in full-time equivalents. The third indicator measured the average number of days for which the pedagogic staff had attended training courses in the past year. The topics of these courses could range from quality assurance, management, subject knowledge, to working with parents or specific groups of children. As shown in Table 1, groups on average consisted of 20 children with a child-teacher-ratio of about 13 to 1. Teachers on average took part in 4.5 days of further training in the past year.

Learning activities and materials (subdimension of process quality). Several studies showed that attending ECEC institutions of high process quality positively affects children’s development although the effect sizes vary (e.g., Dearing et al., 2009; Keys et al., 2013). Process quality, however, is difficult to measure quantitatively via survey questions. As possible proxies for the level of stimulation in the specific group environment and the richness of the child’s experience with the social and material environment, the NEPS has asked group teachers about the frequency at which various activities and excursions were performed by the children in the group and about the availability of materials and toys. These questions were developed on the basis of the Revised Early Childhood Environment Rating Scale (Harms, Clifford, & Cryer, 1998). We constructed a summed index of the frequency of day-trips or excursions based on 11 different items, for instance, relating to theater, museum, forest or park, library, farms, and sports

fields. The frequency was measured on a 6-point scale ranging from *never* to *about daily*. ECEC groups performed such excursions on average once a year. A second index summed the frequency of activities performed by children in the respective group based on 10 items, such as reading books, games with numbers, puzzles, role play, sports, dancing or singing, and gardening. For each item the frequency was measured on an 8-point scale ranging from *never* to *several times a day*. On average, children performed most of the listed activities once a day. To capture the availability of various materials for children's play, we created a summed index of 14 items which, for instance, refer to books at different levels of reading difficulty, dolls, building blocks, and musical instruments. Teachers indicated the availability based on four categories: i) not available, ii) sufficient for a couple of children to play with simultaneously, iii) sufficient for simultaneous use by about half the children, and iv) sufficient for all the children. On average, availability of most items in ECEC groups was so that about half of the children could play with the same items simultaneously. All three indices were divided by the number of items to make the value range more similar to the original scales. The Cronbach's alphas for the three indices of excursions, activities, and materials, were .63, .78, and .86, respectively, indicating adequate to high levels of internal consistency.

Composition of children. As a third dimension of the ECEC learning environment, we considered the composition of children in ECEC centers based on their parents' educational level and on the family language. To capture educational composition, we calculated for each institution i) the share of children whose parent completed a college degree, ii) the share of children with a low-educated parent, which we operationalized as not having completed a vocational training or A-levels, and iii) the share of children who mainly speak another language than German at home. Although it seems unlikely that the association between the share of children with a certain background characteristics and children's cognitive and language

development is linear, there are no established thresholds in the literature and these composition variables are usually used as continuous variables (e.g., van Ewijk & Slegers, 2010a, 2010b).

We therefore also use these as continuous variables but later discuss possible implications. In our sample, the average share of children with low-educated parents was 9%, the share of college-educated parents 23%, and the share of children with non-German family language was 9% at the ECEC institution level.

Independent Variables

Parental education and family language. The key explanatory variables in this study relate to educational qualifications of parents and the families' home language. In line with the definition applied for the dependent variables, we distinguished between three frequently applied categories for the *parent's highest educational attainment*: i) college degree, ii) vocational or A-level degree, and iii) less than a vocational or A-level degree (*Author*, 2013). A *non-German family language* was operationalized as speaking mostly or only another language than German at home (see also Lehl et al., 2014). We chose to use family language as a measure for migration background because it best captures possible language barriers that might be an additional disadvantage for families with migration background even when SES and other characteristics are controlled. As only 9% of parents fall into the group with a low level of education and 9% of children live in a family where mainly a foreign language is spoken, these measures can be considered to capture relatively high levels of disadvantage in terms of educational qualifications and migration background (e.g., *Author* 2013). We also tested alternative specifications in sensitivity tests (see below).

Regional controls. As residential segregation might be an important driver of inequalities in particular with respect to the composition of children in ECEC centers, we controlled for the unemployment rate at the county level, for the percentage of foreign citizens living within the

same residential block in a 7-point index and for the average socio-economic status of the block in a 7-point index. The latter represents a combined measure of educational degrees and occupational status of residents in the area. Both measures of the residential area were constructed by the geographical Microm database (Goebel et al., 2007). To differentiate between rural and urban areas, we considered the number of inhabitants of the municipality. To capture variations in the level of structural quality which is offered in the neighborhood in which parents live due to variations between state and municipality regulations, we controlled for the county means in child-teacher-ratios for this age group, in the group size, and in the percentage of pedagogic staff with a vocational degree. These are the only regional indicators on ECEC quality available based on administrative records. As they correlate strongly, we included in the regression models only the most significant predictor of the respective dependent variable. In addition, we also considered whether the family lives in East or West Germany, as structural quality has been shown to differ significantly due to regulatory differences.

ECEC center controls. We also took further characteristics of the chosen ECEC institution into account. We considered whether the institution had a focus on foreign languages and included a variable of the type of ECEC provider. The latter differentiates between i) state or municipality providers, ii) church-related providers, iii) other non-profit providers, and a fourth category of less common types such as parent initiatives, for-profit providers and other forms. Just over 10 percent of institutions had a bilingual focus. A large majority of over 80 percent of ECEC centers are run by state institutions or religious providers. Other provider types play a negligible role in most regions.

Family controls. Finally, we controlled for a number of other characteristics of the main caregiver and of the household, which may influence parents' selection of ECEC institution and therefore partly account for social and ethnic disparities. First of all, we considered the number of

siblings, and whether the main caregiver was a single parent, which applied to 16 percent of the cases. Secondly, we controlled for the employment status of the responding parent – mostly the mother –, differentiating between not employed, working short part-time hours up to 15 hours per week, working longer part-time hours, or full-time employed and for the natural log of household income. While about one third of mothers were not employed, the majority worked part-time.

Data Analytic Plan

We applied multivariate Ordinary Least Squares (OLS) regression models to investigate whether children with low-educated parents or a non-German family language attended ECEC centers which differed with respect to several aspects of the ECEC learning environment (q_i) (see equation 1). We first estimated baseline models where we included only parental educational attainment (e_h) and family language (l_h). In several steps, we added indicators of regional segregation in the neighborhood and structural quality at the county level (x_r), characteristics of the ECEC institution (y_i), and household level control variables (z_h) to see whether including these variables reduced any differences by parental education and family language. As the differences were hardly affected, we show only the last modeling step including all control variables. We accounted for the clustering of children within institutions and counties by computing robust standard errors clustered at the county level.

$$q_i = \beta_1 + \beta_2 e_h + \beta_3 l_h + \beta_4 x_r + \beta_5 y_i + \beta_6 z_h + \varepsilon_i \quad [\text{eq.1}]$$

The intra-class correlations in a recent study (Stahl, 2015) based on the same data suggest that most of the variation in ECEC group quality characteristics is located at the institution and group level. For group size and teacher-child-ratio, about 18 percent of the variation is located at the county level, about 30 percent at the institution level and about 50 percent at the group level. For other quality aspects like further training, activities, materials and social composition, the

variation is even smaller at the county level and the majority of the variation is located at the institution or group level. Some additional tests of stepwise regression models of social composition point to family characteristics accounting for a larger share of the variation than county and neighborhood indicators.

Results

Descriptive Means by Parental Education and Family Language

Table 2 shows the means on the nine indicators of the ECEC learning environment (our dependent variables) for subgroups of children by parental education and family language (for an overview of bivariate correlations between all dependent variables and independent variables, see Tables A.2 and A.3 in the Appendix). Structural quality indicators, such as the average group size, child-teacher-ratio in ECEC groups, and average days of further training for educators did not differ by educational level of children's parents or family language.

Children with low-educated parents or non-German family language attended ECEC groups which undertook slightly fewer excursions. Also for the frequency of activities and for availability of toys and materials, we observe slightly higher values for children with German family language. The size of all these differences, however, range between one sixth and one third of a standard deviation and can be considered modest.

More substantial differences emerged with respect to center composition. Children whose parents had low educational qualifications attended centers with an average percentage of children with low-educated parents of 34% in contrast to an average of only 3% for children whose parents had a college degree. Children with a non-German family language attended centers with a proportion of 20% of children with low-educated parents while this average share was only 8% for children who spoke German at home. For the share of children with college-educated parents, the picture was reversed. The share of children who did not speak mostly

German at home was on average 20% in ECEC institutions attended by children from low-educated parents compared to 6% in centers attended by children of highly educated parents. Children who themselves mostly did not speak German at home attended institutions where on average 32% of the children in the center had a non-German family language, whereas this share was only 7% for children from German-speaking families.

Multivariate Analyses

Tables 3 to 5 show the main result for OLS regression models of structural quality, learning activities and play materials, and center composition, respectively

Structural quality. There were no statistically significant differences by family language or educational level of parents in using an ECEC center with high structural quality (Table 3). Among the control variables, county level averages of the respective quality indicators, the unemployment rate, town size, and ECEC provider type showed significant associations with some of the structural quality characteristics of ECEC centers. The adjusted R^2 of the models was greater for group size (.28) than for child-teacher-ratio and further training (.11 and .06, respectively).

Excursions, activities, and play materials. As shown in Table 4, even after including control variables, children with low-educated parents or non-German family language attended ECEC groups which performed fewer excursions. The differences were of medium size of about one third and one fourth of a standard deviation, respectively.

For the activities performed in the ECEC group, we found no significant associations with either parental education or family language after including regional control variables.

Children who mostly did not speak German at home attended ECEC groups with fewer available toys and play materials even after accounting for household, ECEC center and regional characteristics. The difference amounted to about one third of a standard deviation. Parents'

educational level was not significantly associated with the available materials in the ECEC group. Few of the control variables contributed significantly to explaining the variations in excursions, learning activities, and play materials. The relatively low adjusted R^2 of about .10 across all the models pointed to large unexplained variation in these aspects of child care quality.

ECEC center composition. Even after accounting for residential segregation, regional, institutional and household characteristics, substantial compositional differences by parental educational level and by language spoken at home remained (see Table 5). Compared to children of low-educated parents, children whose parent had completed a college degree or a vocational training on average attended ECEC centers with 21 and 22 percentage points lower shares of children with a low-educated parent, respectively. These differences can be considered large, since they equal about 140% of a standard deviation. Children with a college-educated parent on average attended ECEC centers with a 22-percentage point larger share of children with college-educated parents compared to children whose main caregiver had completed less than a vocational training. Again, this difference of about one standard deviation must be considered substantial. Regarding the percentage of children with a non-German family language, the models showed substantial differences of about 21 percentage points between children with and without German family language. This difference equals 145% of a standard deviation.

Unsurprisingly, regional characteristics were very important in explaining compositional differences between ECEC centers: Counties' unemployment rates, the socioeconomic status of the residential area, the number of inhabitants of the municipality and the region (East/West) were significantly associated with ECEC center composition. Regarding other ECEC center characteristics, it turned out that parent initiatives, for profit or other providers showed more favorable child compositions than ECEC centers run by municipality providers. Few other household level control variables showed significant relationships with the three measures of

ECEC center composition. Due to the strong association of parental education and language background and regional characteristics with ECEC center composition, the adjusted R^2 of these models were relatively large, ranging from .33 to .45.

Sensitivity Analyses

We tested binary specifications of some of the dependent variables using logistic regression models (available from the authors on request). We examined a binary measure of whether pedagogic staff had completed any further training. For each of the indices for excursions, activities, and materials, we examined categorical specifications distinguishing the top 10 or 25% of groups from the rest. The results were similar to those presented above. We also performed a cluster analysis to see whether parents may choose ECEC quality characteristics as a bundle instead of optimizing individual aspects. Again we found hardly any significant differences by parental educational level or family language.

We also tested less extreme specifications of low education and non-German family language and examined how the results change if we focus on migration background instead of family language. First, we included parents with A-level degrees but no vocational training. Second, we tested two indicators distinguishing whether i) the parent's mother tongue was not German, or ii) the child's mother tongue was not German. Third, we operationalized migration background as at least one parent was born abroad. Some of these specifications showed smaller differences in terms of excursions and available materials. The variations in terms of composition were hardly affected.

Tests with additional control variables including the number of children and pedagogic staff in the respective ECEC center, the group structure, child age and health and home learning environment did not alter the relationships between the dependent variables and parental education level and family language substantially.

Discussion

This study has explored social and ethnic differences in the use of early education institutions with varying characteristics by four- and five-year-old children in Germany. We extended the literature by comparing several different dimensions of ECEC centers' learning environments and by examining whether differences by parental education level and family language in the use of ECEC institutions are similar across different aspects of the learning environment. We conclude that the extent of social and ethnic disparities in using an ECEC center varies strongly by the different dimensions of the ECEC learning environment. Both hypotheses were only partly supported: For structural quality, we did not find any differences by parental education or family language. Regarding activities and materials, we only found moderate differences for some quality aspects by parental education (excursions) and by family language (excursions and materials). In contrast, strong associations could be found between parental education and family language with compositional characteristics of ECEC centers: Children of lower educated parents and those with a non-German family language attended institutions with higher proportions of children from families with low-educated parents and from families with a non-German family language, respectively.

On the whole, our results provide only limited support for the family investment model in terms of ECEC choices of parents, as social and ethnic differences with respect to the most easily observable structural quality indicators such as group size and child-teacher-ratio are not significant. The accommodation model fits the results better in particular with respect to the large differences we found in terms of composition of ECEC institutions, as stratified social networks, information and cultural preferences may be possible explanations.

Our result of hardly any differences in the use of high-quality ECEC institutions by parental education and family language seem surprising and clearly contradict our hypotheses.

However, they are quite in line with similar results from the German BiKS study (Lehrl et al., 2014). In contrast, studies from the US more frequently (although not consistently) found social and ethnic differences in the use of high-quality ECEC centers (Bolger & Scarr, 1995; Karoly & Gonzalez, 2011; Torquati et al., 2011). However, the results of our study are hardly comparable to the results from US studies because of the very different ECEC systems. It would be an interesting question for future research whether these differences appear exactly *because* of the different ECEC systems. One may speculate that a system with universal ECEC access, large share of public ECEC funding and low parental fees (as in Germany) might reduce inequalities in access to high-quality ECEC centers. At the same time, the German ECEC system offers on average only mediocre quality (Tietze et al., 2013). It would therefore be interesting to systematically evaluate in future research in how far these and other characteristics of ECEC systems are related to (1) average quality of ECEC institutions and (2) equality in access to high-quality ECEC institutions. To test this empirically, an international comparative study would be needed that includes more countries with varying ECEC systems. With such a study, it could be analyzed how high ECEC quality as well as equal access to high quality institutions can be ensured simultaneously.

In contrast to the small or non-existent social and ethnic differences in the use of high-quality ECEC centers, our results point to substantial compositional differences by parental education and family language even after accounting for measures of regional ECEC context and residential segregation. These findings are consonant with those presented by *Author* (2010) in her regionally more restricted analysis in two German states. In our study, the quality indicators showed no or only small correlations with the composition indicators (see Table A.2). The two largest correlations can be found between the share of children with non-German family language and group size ($r=.135$) and between the share of children of low educated parents and the

frequency of excursions ($r=.10$). Thus, studies that only focus on ECEC quality and do not consider the composition of children might miss an important independent aspect of the ECEC learning environment that seems to be associated with more selectivity on the part of the parents than the standard quality indicators.

So, the question instantly arises why we found more pronounced differences regarding ECEC composition than for ECEC quality. Parents in Germany may not be able to assess differences across ECEC centers in terms of quality – but they probably can do so regarding centers' compositions of children. Segregation in preschools and schools is much more visible for parents than quality differences are – and it is also a prominent topic in the German media. A “flight” of native-born German parents from schools with a high concentration of ethnic minorities has already been demonstrated (Morris-Lange et al., 2013) – similar processes may be at work for ECEC center selection.

The large selectivity in choosing ECEC centers with specific social and ethnic compositions also highlights the need to better understand the possible consequences of such compositions. Previous research suggested that a higher proportion of high-SES peers and higher average peer skill levels (which are both correlated) positively affect children's cognitive and language skills (Henry & Rickman, 2007; Melhuish et al., 2008; Reid & Ready, 2013; Weiland & Yoshikawa, 2014). In addition, a higher share of peers from immigrant families in the ECEC center is negatively associated with children's language skills – but only for children of immigrants with a foreign language spoken at home (Author 2017; Niklas et al., 2011). These results show that compositional characteristics of ECEC centers may indeed be consequential for children's future educational careers and clearly suggest that socially and ethnically diverse ECEC classrooms are preferable to segregated classrooms with high proportions of children from low-SES and ethnic minority backgrounds (Reid et al., 2015). However, the exact relationships

with respect to possible thresholds or other non-linear relations are hardly analyzed so far. This is clearly an important topic for future research. Regarding the consequences of compositional characteristics of ECEC centers, also other outcomes should be regarded in future research that have not been the focus of this paper: Socially and ethnically diverse ECEC institutions may also be advantageous regarding children's social skill development, may reduce prejudices and promote cross-cultural relationships (Reid et al., 2015).

Limitations

Our study only aimed at analyzing whether or not social and ethnic disparities in the use of ECEC centers with a beneficial learning environment exist. Because of data limitations, we were not able to further explore the reasons for these disparities, e.g. the role of social networks or parents' knowledge about or trust in ECEC quality. A further limitation is that the available data do not allow us to assess whether the considerable quality variation at the county and federal state level is also reflected in variation at the neighborhood level, which is crucial for assessing the amount of choice parents have between institutions of different quality. Furthermore, we had to rely on rather restricted measures of residential segregation. Future research using other data sets should aim at understanding better how residential segregation and regional disparities structure parental ECEC selection (also see Bassok & Galdo, 2016; Burchinal, Nelson, Carlson, & Brooks-Gunn, 2008; Cloney, Cleveland, Hattie, & Tayler, 2015). Furthermore, it is debatable in how far our dependent variables represent good indicators for a "beneficial learning environment". Structural quality indicators do not always show a clear association with children's development or work only indirectly (e.g., Mashburn et al., 2008; NICHD 2002). With regard to process quality, we were only able to draw on indicators for one sub-dimension (materials and learning activities) and could not consider measures based on expert observations, for instance of interactions of teachers with children, which have often been found to be most closely related to

child development. These questionnaire items we used will need further validation with respect to their relationship with observed process quality and child development. We used continuous variables of composition of children with different family background characteristics as imperfect proxies for skill level composition. Although the effects of composition are unlikely to be linear, to-date, there are no established thresholds in this regard in the literature, e.g. which exact shares of high- or low-SES children constitute a beneficial composition. Hence our results should be interpreted in a broader sense in terms of parents using an ECEC center with a higher or lower share of children with certain background characteristics. Overall our results therefore can only be interpreted as measuring social differences in some contextual conditions in terms of staff, material equipment, and composition which some previous studies have found to relate to process quality in ECEC institutions and child development.

Despite these limitations, this study provides an important extension to the existing literature by examining social and ethnic differences in various characteristics of ECEC services attended by children for a representative sample of ECEC institutions in Germany. We have investigated a larger range of indicators of the ECEC learning environment than previous studies to better understand how parents choose between ECEC institutions and have shown that it is important to differentiate between ECEC quality and compositional characteristics.

Policy Implications

The finding that large social and ethnic inequalities in ECEC use exist regarding the composition of children is also of great policy-relevance as these compositions are also consequential for children's academic development (see also Reid et al., 2015). One implication may be that state funding rules and structural quality standards (e.g., group sizes) should take the social and ethnic composition of the children in the ECEC centers more strongly into account. So far only half of the German states have regulations which provide more funding for individual

children from disadvantaged backgrounds or institutions with a high share of such children. However, the threshold levels at which current regulations allocate more resources to ECEC institutions with disadvantaged children vary and can be as high as 40% (Hogrebe, 2014, p. 166-170), which is likely to support only institutions and neighborhoods with very high prevalence of disadvantage. Secondly, directors and pedagogic staff of ECEC centers with high concentrations of children from families with low educational qualification and non-German family language face particular challenges which may require further support. They do not only need to develop good pedagogical concepts which take into account the composition of children but they also need to communicate these concepts well to (potentially interested) parents to counteract social and ethnic segregation at the ECEC institution level.

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Table 1: *Descriptive Statistics for All Variables*

	Mean/ Percentage	SD	Min	Max
<i>Characteristics of the ECEC center (dependent variables):</i>				
Child-teacher-ratio	12.76	6.39	2.99	35.72
Group size	20.1	5.03	5.00	44
Days of training	4.52	12.25	0	66.38
Excursion index	2.22	0.47	1.00	3.73
Activities index	7.12	0.62	4.80	8.00
Material index	1.62	0.42	0.71	3.00
Share of children with low educated parents (%)	8.72	14.99	0	100
Share of children with college-educated parents (%)	23.07	22.85	0	100
Share of children with a non-German family language (%)	8.80	14.53	0	83.33
<i>Family characteristics (main independent variables):</i>				
Low parental education	9.07			
Medium parental education (A-levels or vocational training)	68.57			
High parental education (university degree)	22.36			
Family language not German	8.61			
<i>Regional, ECEC institution and household level controls</i>				
County unemployment rate	7.63	3.44	1.40	16.70
Foreign citizens in residential block	5.17	2.49	1.00	9.00
Socio-economic status in residential block	4.86	2.64	1.00	9.00
Municipality >100,000 inhabitants	33.24			
Municipality 20,000-100,000 inhabitants	30.65			
Municipality <20,000 inhabitants	28.32			
County child-teacher ratio	7.73	0.99	5.73	10.35
County group size	22.05	3.46	13.00	25.50
County percentage of educators with vocational degree	75.10	10.44	49.34	96.30
East Germany	20.11			
ECEC provider: state	37.77			
ECEC provider: church-related	44.56			
ECEC provider: other non-profit	13.22			
ECEC provider: Parent-initiative or for-profit or other	4.45			
ECEC focus on foreign language	10.76			
One sibling	47.53			
More than one sibling	24.58			
Lone parent	16.47			
Net household income	3073.62	2619.47	220	10000
Mother full-time employed	21.79			
Mother long part-time employed	38.06			
Mother short part-time employed	7.61			
Mother not employed	32.54			

Source: NEPS – Kindergarten Cohort, 2011. Note. N=1,800.

Table 2
Means of ECEC Characteristics by Parental Education and Family Language

<i>ECEC center characteristics</i>	All families	Parental education			Sign.	Family language		Sign.
		low	medium	high		Non-German	German	
Child-teacher-ratio	12.76	12.66	12.96	12.18		12.51	12.79	
Group size	20.1	19.94	20.12	20.10		20.77	20.05	
Days of further training	4.52	4.52	4.46	4.74		3.41	4.63	
Excursion index	2.22	2.07	2.21	2.22	a*, b†	2.09	2.21	*
Activities index	7.12	6.96	7.07	7.10		6.90	7.10	†
Material index	1.62	1.62	1.64	1.62		1.51	1.64	**
Share children with low-educated parents (%)	8.72	34.23	7.12	3.30	a***, b***, c***	20.20	7.64	***
Share of children with college-educated parents (%)	23.07	9.52	17.35	46.09	a***, b***, c***	13.80	23.94	**
Share of children with a non-German family language (%)	8.80	20.35	8.40	5.59	a**, b***, c**	32.43	6.62	***

Source: NEPS – Kindergarten Cohort, 2011.

Notes. Significance levels are based on OLS regressions with robust standard errors clustering at ECEC institution level. The letters a, b, and c refer to the two education groups which were compared: a: low vs. medium, b: low vs. high, c: medium vs. high. *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .1$

Table 3
OLS Regression Models of Structural ECEC Quality

	Child-teacher-ratio		Group size		Educator further training			
	<i>b</i>	<i>RSE</i>	<i>b</i>	<i>RSE</i>	<i>b</i>	<i>RSE</i>		
<i>Parental education and family language</i>								
Medium parental education	0.35	0.72	0.78	0.53	0.03	0.96		
High parental education	0.39	1.05	1.00	0.72	0.65	1.20		
Family language not German	-0.30	0.78	0.37	0.60	-0.71	0.84		
<i>Regional controls:</i>								
County unemployment rate	0.32	0.14	*	0.02	0.13	0.26	0.17	
Foreign citizens in block	-0.03	0.10		0.00	0.07	0.11	0.10	
Socio-economic status in residential block	-0.01	0.10		0.09	0.08	-0.11	0.10	
>100,000 inhabitants	-2.27	1.01	*	-0.89	1.00	-1.09	1.52	
20,000-100,000 inhabitants	-0.70	0.84		0.08	0.65	0.24	0.96	
County child-teacher ratio	0.80	0.40	*					
County group size				0.51	0.21	*		
County perc. educators w. vocational degree						-0.08	0.07	
East Germany	1.03	1.22		-0.83	2.26	1.28	1.37	
<i>ECEC center controls:</i>								
Religious provider	-1.26	0.70	†	0.56	0.73	1.56	1.50	
Other non-profit	-1.66	1.28		-1.10	0.87	0.47	1.17	
parent initiative, for profit or other	-5.24	1.15	***	-2.62	1.30	*	1.24	1.49
Foreign language focus	2.47	1.39	†	1.36	0.82	†	-1.29	0.99
<i>Family controls:</i>								
One sibling	-0.08	0.50		0.21	0.37	-0.74	0.59	
More than one sibling	0.46	0.50		0.30	0.44	-0.81	0.71	
Lone parent	-0.93	0.59		0.30	0.38	-1.36	0.63	*
Ln net household income	-0.38	0.38		-0.34	0.33	0.56	0.84	
Mother full-time	0.61	0.51		0.45	0.61	-0.63	0.92	
Mother long part-time	0.96	0.44	*	0.25	0.41	-1.33	0.65	*
Mother short part-time	1.00	0.83		-0.83	0.74	-0.77	1.25	
Constant	7.76	4.00	†	10.60	5.80	†	4.58	9.09
<i>N</i> children	1,651			1,712			1,800	
<i>R</i> ² adj.	0.11			0.28			0.06	

Source: NEPS – Kindergarten Cohort, 2011.

Notes. *RSE* = robust standard errors. Reference categories: low parental education, German family language, < 20,000 inhabitants, West Germany, municipality provider, no foreign language focus in ECEC center, no siblings, two-parent family, mother not employed. *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .1$

Table 4
OLS Regression Models of Excursions, Activities, and Play Materials in ECEC Center Groups

	Excursion index		Activities index		Material index	
	<i>b</i>	<i>RSE</i>	<i>b</i>	<i>RSE</i>	<i>b</i>	<i>RSE</i>
<i>Parental education and family language</i>						
Medium parental education	0.16	0.05 **	0.04	0.11	-0.07	0.06
High parental education	0.14	0.07 *	0.05	0.13	-0.10	0.07
Family language not German	-0.11	0.07 †	-0.14	0.12	-0.14	0.06 *
<i>Regional controls:</i>						
County unemployment rate	0.02	0.01 †	-0.01	0.02	0.01	0.01
Foreign citizens in residential block	0.01	0.01	0.01	0.01	0.01	0.01
Socio-economic status in residential block	0.01	0.01	0.02	0.01 †	0.02	0.01 †
>100,000 inhabitants	0.04	0.09	0.17	0.12	-0.09	0.06
20,000-100,000 inhabitants	0.01	0.08	-0.07	0.09	0.01	0.05
County child-teacher ratio	0.02	0.04	0.05	0.05		
County group size					0.01	0.01
East Germany	-0.01	0.13	0.14	0.20	0.26	0.14 †
<i>ECEC center controls:</i>						
Religious provider	-0.11	0.08	0.01	0.09	0.07	0.06
Other non-profit	0.02	0.09	-0.04	0.12	0.09	0.08
Parent initiative, for-profit or other provider	0.22	0.15	0.15	0.19	0.21	0.12 †
Foreign language focus	-0.15	0.11	-0.34	0.14 *	0.04	0.06
<i>Family controls:</i>						
One sibling	-0.03	0.03	-0.04	0.06	-0.02	0.03
More than one sibling	-0.02	0.04	-0.03	0.07	-0.05	0.04
Lone parent	0.02	0.04	0.05	0.06	-0.02	0.04
Ln net household income	0.02	0.03	-0.02	0.05	-0.01	0.03
Mother full-time	0.01	0.04	0.02	0.06	0.02	0.04
Mother long part-time	0.00	0.04	-0.01	0.04	0.04	0.03
Mother short part-time	0.07	0.06	0.04	0.09	0.15	0.06 *
Constant	1.58	0.43 ***	6.76	0.51 ***	1.29	0.41 **
<i>N</i> children	1,733		1,712		1,535	
<i>R</i> ² <i>adj.</i>	0.10		0.09		0.10	

Source: NEPS – Kindergarten Cohort, 2011.

Notes. *RSE* = robust standard errors. Reference categories: low parental education, German family language, <20,000 inhabitants, West Germany, municipality provider, no foreign language focus in ECEC center, no siblings, two-parent family, mother not employed. *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .1$

Table 5
OLS Regression Models of ECEC Center Composition

	Share of children with low-educated parents			Share of children with college-educated parents			Share of children with a non-German family language		
	<i>b</i>	<i>RSE</i>		<i>b</i>	<i>RSE</i>		<i>b</i>	<i>RSE</i>	
<i>Parental education and family language</i>									
Medium parental education	-21.01	4.89	***	2.20	1.65		-2.58	2.65	
High parental education	-21.61	4.74	***	21.87	2.76	***	-4.04	2.63	
Family language not German	0.74	2.27		-2.19	1.90		21.09	3.13	***
<i>Regional controls:</i>									
County unemployment rate	1.02	0.32	**	-1.08	0.41	*	0.44	0.36	
Foreign citizens in residential block	0.06	0.18		0.29	0.26		0.33	0.21	†
Socio-economic status in residential block	-0.87	0.34	*	2.22	0.24	***	-0.37	0.23	†
>100,000 inhabitants	-0.59	1.93		11.25	3.70	***	2.62	1.85	
20,000-100,000 inhabitants	3.06	1.64	†	2.09	2.44		3.62	1.61	*
County child-teacher ratio	0.50	0.76		-3.18	2.12		0.21	0.78	
East Germany	-10.67	2.17	***	9.26	6.00		-5.36	2.16	*
<i>ECEC center controls:</i>									
Religious provider	-3.79	1.86	*	1.47	2.66		-1.22	1.66	
Other non-profit	-2.66	2.44		-2.00	4.18		-3.30	2.01	†
parent initiative, for profit or other provider	-6.72	1.66	***	14.88	3.88	***	-3.87	1.93	*
Foreign language focus	1.55	1.72		-1.96	1.85		2.82	2.10	
<i>Family controls:</i>									
One sibling	-0.39	0.94		2.37	1.17	*	0.99	0.78	
More than one sibling	-0.99	1.19		4.81	1.71	*	-1.43	0.87	†
Lone parent	1.85	1.40		2.27	1.69		0.31	0.95	
Ln net household income	-1.15	0.71	†	1.54	1.13		-0.46	0.81	
Mother full-time	-0.36	0.93		-0.06	2.03		0.63	1.04	
Mother long part-time	-1.03	0.97		1.13	1.95		0.06	0.74	
Mother short part-time	-1.26	1.32		0.56	2.35		-0.56	1.82	
Constant	32.05	10.03	**	15.77	20.11		7.47	8.55	
<i>N</i> children	1,801			1,801			1,801		
<i>R</i> ² <i>adj.</i>	0.42			0.45			0.33		

Source: NEPS – Kindergarten Cohort, 2011.

Notes. *RSE* = robust standard errors. Reference categories: low parental education, German family language, < 20,000 inhabitants, West Germany, municipality provider, no foreign language focus in ECEC center, no siblings, two-parent family, mother not employed. *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .1$

Appendix

Table A.1

Descriptive Statistics Regarding Parents' (Most) Important Criteria for ECEC Selection

	<i>Mentioned as the most important criterion</i>		<i>Mentioned as one out of five important criteria</i>	
	Frequency	Percentage	Frequency	Percentage
Criterion related to convenience or work compatibility (proximity, opening hours, sibling)	366	64.89	541	73.11
Criterion regarding structural quality, pedagogic concept or activities	120	21.28	490	66.22
Other criterion (recommendation, parental influence)	18	3.19	223	30.14
Had no choice	60	10.64	60	8.11
<i>N</i>	564	100.00	740	

Source: K²ID-SOEP Parent survey, 2013/14.

Table A.2:
Pairwise Pearson correlation coefficients of the dependent variables

	Child- teacher- ratio	Group size	Days of further training	Excursion index	Activities index	Material index	Share children with low- educated parents	Share of children with college- educated parents	Share of children with a non- German family language
Child-teacher-ratio	1								
Group size	0.253***	1							
Days of further training	0.024	-0.094***	1						
Excursion index	-0.024	-0.065**	0.034	1					
Activities index	-0.080**	0.132***	-0.029	0.153***	1				
Material index	-0.0405	-0.165***	0.026	0.246***	0.142***	1			
Share children with low- educated parents	-0.0313	0.038	0.010	-0.104***	-0.019	-0.022	1		
Share of children with college-educated parents	-0.099***	-0.055*	0.000	0.020	0.060*	-0.017	-0.348***	1	
Share of children with a non- German family language	-0.0271	0.135***	-0.044 †	-0.098***	-0.048*	-0.085***	0.452***	-0.204***	1

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .1$

Source: NEPS – Kindergarten Cohort, 2011

